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ABSTRACT

Evaluated was the effectiveness of the Columbus, Ohio, tutoring program for neurologically handicapped children by investigating the relationship between tutored (129 children) and non-tutored (117 children), two instructional approaches, IQ level and academic success, disability patterns and success probabilities, and parent awareness and student performance. Admittance to the tutoring program required the medical diagnosis of a neurological handicap and an IQ of 80 or above. Either an innovative language-centered approach or an unstructured approach was used in tutoring. Evaluation was based on three sources of data; test scores, average grades, and success rate (defined as bringing D or E grades up to C, B, or A). Findings indicated that the average grades of tutored students improved significantly in the five subject/skill areas at the completion of tutoring and continued to be higher after 2 years without tutoring; that the average grades of non-tutored students remained the same or decreased over the same time period; that no significant differences existed between the language-centered approach and the unstructured approach for any of the three measures; that IQ level was not related to success; that no particular pattern of disability was more or less likely to be successful than any other pattern; and that students whose parents were considerably aware of a disability were more likely to be successful than students whose parents were minimally aware of the disability. Suggestions for further research included development of a training program for tutors. (DB)

Jean Newborg

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AN EVALUATION OF THE COLUMBUS, OHIO, TUTORING PROGRAM FOR NEUROLOGICALLY HANDICAPPED STUDENTS

to

COLUMBUS BOARD OF EDUCATION

September 24, 1971

by

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I. INTRODUCTION

In 1961 the Columbus, Ohio, school system established a tutoring program for neurologically handicapped (NH) students. As defined by the Columbus system, a neurologically handicap is a disorder in one or more of the basic psychological processes involved in understanding or in using spoken or written language. These may be manifested in disorders of listening, thinking, talking, reading, writing, spelling, or arithmetic. They include conditions which have been referred to as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, developmental aphasia, etc. They do not include learning problems which are due primarily to visual, hearing or motor handicaps, to mental retardation, emotional disturbance or to environmental disadvantage. To be eligible for the tutoring program, a medical diagnosis of a neurological handicap must be made; and physical, mental, social, and emotional readiness must be evaluated by an attending physician and a qualified psychologist. An intelligence quotient (IQ) of not less than 80 is required.*

The purpose of the tutoring program is to give supportive help that will enable students to function in a regular classroom. Tutoring is provided to students for a maximum of one hour each school day. The tutors are certificated teachers who travel between schools. No specific approach is stressed by all the tutors. Rather, each tutor, in consultation with classroom teachers and administrators, evaluates a student and uses the method she considers to be the most beneficial. Inservice programs are held periodically to provide an opportunity for tutors to learn further about theory, methods, and materials related to a neurological handicap.

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* Edward C. Grover and Joseph H. Todd, Ohio Program for Neurologically Handicapped Children, Ohio Department of Education, Columbus, Ohio, 1967, p.60.

Previous studies of special classes for NH students have investigated the value of a medical diagnosis of neurologically impairment, and have sought to determine predictors of future success.* Informal observations of neurologically handicapped students have been made by teachers and others regarding the results of tutoring; however, no formal evaluation of the tutoring program has been made to date. In view of the significant resources involved in tutoring, a systematic evaluation of the program was judged to be important. The basic intent of the evaluation is to provide information useful for improving and upgrading the instruction provided to neurologically handicapped students. In addition, the findings suggest guidelines to administrators for establishing priorities in an area of handicap about which relatively little is known. Thus, in brief, it is the overall purpose of this study to provide a basis for improving the Columbus tutoring program and for establishing priority areas.

The remainder of this report is divided into six sections. Section II states the specific objectives of the study. Sections III-V present methodology, data anlaysis, and conclusions related to the three study objectives. Section VI summarizes the entire study and draws conclusions based on the data. Suggestions for further research in the subject areas are given in Section VII.

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* Suzanne Gage, Final Report on "A Study to Compare the Maladaptive Behaviors of Students With and Without a Medical Diagnosis of Neurological Impairment", to Columbus Board of Education, Battelle Memorial Institute, Columbus, Ohio, August 27, 1969, and Suzanne Gage, "A Study to Predict the Influence of Several Factors in Determining Future Success of Neurologically Handicapped Students", M.A. Thesis, Ohio State University, 1969.

II. OBJECTIVES

The present study addresses itself to three objectives. The first objective is to determine the extent to which tutoring, per se, is effective in raising the performance of neurologically handicapped students. Stated in terms of a research question: Is the performance of NH students who have been tutored significantly better than the performance of NH students who have received no tutoring? The description of the methodology, results, and conclusions related to this question is presented in Section III.

The second objective is to determine if the present tutoring program could be improved by using an innovative tutoring approach that stresses the structure, use, and understanding of language. The specific research question here is: Is a language-centered tutoring approach more effective, less effective, or equally as effective as the present unstructured approach? The comparison of the two approaches is given in Section IV.

The final objective is to determine the characteristics of students who are successful (i.e., demonstrate performance judged to be equivalent to a letter grade of "A", "B", or "C") when given tutoring assistance. Three characteristics are considered: I.Q., type of learning disability, and parent awareness of the disability. The research questions asked in relation to the third objective are:

- Is a student of below average IQ (80-89 IQ points) as likely to be successful with tutoring assistance

as the student with at least average IQ (90 IQ points and above)?

- Is a student having any pattern of disability as likely to be successful as a student having any other pattern of disability?
- Does the degree of parent awareness of a tutored student's disability relate significantly to the student's performance.

Analysis of results related to the third objective are given in Section V of this report.

III. EFFECTIVENESS OF THE REGULAR TUTORING PROGRAM

The first objective of this study is to determine the extent to which the regular tutoring program is effective in raising the performance of NH students. The following paragraphs describe the student population on which data were obtained, the data collection procedures, the results obtained, and the conclusions reached.

Selection of Students

Two groups of students were selected to determine the effectiveness of the regular tutoring program. The first group (Group NT) consisted of 117 students who had been identified as NH but who had received no tutoring services. These students were initially identified as NH at different elementary grade levels. That is, some were identified in first grade, others in second grade, and so on. The number of years between identification and the present ranged from two to eight years.

The second group (Group RT) consisted of 129 NH students who had received regular tutoring services for one to four years, but who were not presently in the program. Fifty-eight (45%) had been tutored for one year, 53 (41.9%) were tutored for two years, and 16 (12.4%) received assistance for three years. Only one student (less than 1%) was tutored for four years.

To the extent possible, the two groups were grossly matched on two variables: year of birth and IQ at referral. Tables 1 and 2 present the data related to year of birth and IQ for both groups.

TABLE 1. YEARS OF BIRTH OF UNTUTORED (GROUP NT) AND TUTORED (GROUP RT) STUDENTS

	No Tutoring	Received Tutoring
Mode*	1957	1956
Range	1952-63	1953-61
N**	117	129

* The year of birth having the highest number of cases.

** Total number of cases in each group.

TABLE 2. IQ OF UNTUTORED (GROUP NT) AND TUTORED (GROUP RT) STUDENTS

	No Tutoring	Received Tutoring
Mean*	100.4	100.0
S.D.**	12.9	12.6
Range	81-153	80-130
N	117	129

* Arithmetic Mean, or Average.

** Standard deviation, a measure of dispersion or variability.

Data Collection

All data for the present study were collected by the staff of the Columbus Department of Special Education. Descriptive information and performance measures were recorded on student data forms developed jointly by Battelle and the Department of Special Education. The data forms are included as Appendix A.

The descriptive data and information gathered for this phase of the present study is listed below.

- Birth date.
- Year of referral. (Year of referral is the academic year in which school personnel, parents, or others referred the student to the Department of Special Education for evaluation.)
- Grade level at identification. (This information was recorded only for Group RT.)
- Number of years since identification. (This information was recorded only for Group NT.)

- Number of years of tutoring. (This information is specific to Group RT.)
- Number of grade levels repeated.
- Grade levels repeated.
- IQ at referral.
- Most recent IQ.
- Type of academic and behavioral disability. Five classifications of academic disabilities and four classifications of behavior disabilities were established. These disabilities are:

Academic	Behavior
Small motor	Hyperactive
Visual	Hypoactive
Auditory	Emotional overlay
Oral language	Distractable
Written language	

Each of the nine disabilities was defined in terms of specific, observable behaviors. These behaviors, which were presented in checklist form, are included as Appendix B. Based on information available in a student's permanent file and/or from a student's teachers or principal, one or more of the disabilities listed were checked off on the form.

- Degree of parent awareness. Three categories were established to describe the parent awareness of

a student's learning disability: considerable, partial, and minimal. Behaviors characteristics of each category were presented in checklist form. Based on information available in the student's permanent file, and/or from the student's teachers or principal, one of the three categories was checked.

- Student grades.* This was the only measure of performance used in this phase of the study. Five subjects or skills that were graded over a number of grade levels were selected. These subject/skill areas were: reading, mathematics, language,** work habits, and social habits. Grades from each student's permanent file were recorded for two points in time for Group NT (no tutoring): at identification and currently.*** Grades for students in Group RT (regular tutoring) were recorded for three points in time: at identification, at completion of tutoring, and two years after the completion of tutoring. Letter grades were converted to number grades to allow statistical manipulation of the data. The letter grades were coded on a five-point scale, with five representing superior performance and one representing very unsatisfactory performance.

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* It should be noted that grades were assigned by different teachers at various grade levels and school years.

** A general term for the subject area dealing with the mechanics of language.

*** Currently refers to the 1970-71 school year.

Results

The extent to which tutoring was effective in raising student performance is analyzed and described via two methods; specifically, the mean, or average, grade in each of the five subject/skill areas and a measure of success/nonsuccess were determined for each of the two groups.

Average Grade

The average grade (arithmetic mean) for each of the five subject/skill areas and across areas is presented for the group of students who received no tutoring (Group NT) in Table 3. The data in Table 3 show that the mean, or average, in each of the five subject/skill areas and across areas did not change, or decreased in the time between identification and the present. For reading and mathematics, no changes in average grades were recorded. For language, the average grades decreased by .2 of a letter grade. The decrease in language, expressed as a mean difference, was not statistically significant. That is, the size of the mean difference was such that it could have arisen by chance.

Data in Table 3 show that the average grades in work habits and social habits also decreased. The decreases were large enough to be significant. The decrease of .2 for work habits was significant at the .01 confidence level. The decrease of .3 in social habits was

TABLE 3. AVERAGE GRADE AT IDENTIFICATION AND CURRENTLY IN FIVE SUBJECT/SKILL AREAS AND ACROSS AREAS FOR GROUP NT (N=117)

Subject/Skill	At Identification		Currently	Mean Difference+
Reading	Mn++	2.2	2.1	.0
	S.D.+++	.9	.8	
Mathematics	Mn	2.1	2.0	.0
	S.D.	1.0	.9	
Language	Mn	2.3	2.1	-.2
	S.D.	.8	.8	
Work Habits	Mn	2.2	2.0	-.2*
	S.D.	.8	.7	
Social Habits	Mn	2.6	2.3	-.3**
	S.D.	.8	.8	
Across Areas	Mn	2.3	2.1	-.2**
	S.D.	.6	.6	

* $p \geq .01$

** $p \geq .001$

\+ Mean difference is equal to the current mean minus the mean at identification.

++ Mean, or arithmetic average.

+++ Standard deviation (S.D.) is a measure of dispersion or variability of the numerical grades. The larger the standard deviation is, the more widely spread or dispersed the grades are.

significant at the .001 level.*

An average was computed across all five subject/skill areas and 117 students for the two points in time. The "current" average was .2 lower than the average at identification. This mean difference is statistically significant at the .001 confidence level.

Average grade data for students who had received regular tutoring at some previous time (Group RT) are presented in Table 4. Data for Group RT were collected at three points in time: at identification, at completion of tutoring, and two years after the completion of tutoring. Inspection of these three points indicates a distinct pattern of gain in average grade with tutoring, and a slight decline after its termination. Column D in Table 4 contains the differences (gains) between the average grade at identification and at completion of tutoring. It can be seen that in all five subject/skill areas and across areas the means had risen significantly at the time tutoring services were ended. The gains ranged from .4 in social habits to .6 in reading. All of these gains were statistically significant at or beyond the .001 confidence level.

As noted above, the means in all five subject/skill areas declined slightly after tutoring services were terminated. Column E in

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* A difference significant at the .001 confidence level ($p \geq .001$) means that a difference that large or larger could have occurred by chance only one in 1000 times. For a difference to be considered statistically significant in the present study, a confidence level of .01 ($p \geq .01$) must be met. That is, the difference must be large enough so that it could have occurred by chance only one in 100 times. To determine significance, the t-test for significance of differences was utilized.

TABLE 4. AVERAGE GRADE AT IDENTIFICATION, AT COMPLETION OF TUTORING, AND TWO YEARS AFTER COMPLETION OF TUTORING IN FIVE SUBJECT/SKILL AREAS AND ACROSS AREAS FOR GROUP RT (N=129)

Subject/Skill	A At Identification	B At Completion of Tutoring	C 2 Years After Completion	D Mean Difference (A-B)	E Mean Difference (A-C)
Reading	Mn 2.3 S.D. .9	2.9 .8	2.6 1.0	.6*	.3+
Mathematics	Mn 2.1 S.D. 1.0	2.6 1.0	2.5 1.1	.5*	.4++
Language	Mn 2.3 S.D. .9	2.7 .9	2.6 1.0	.4*	.3++
Work Habits	Mn 2.4 S.D. 1.0	2.9 1.0	2.8 1.0	.5*	.4+
Social Habits	Mn 2.7 S.D. .8	3.1 .9	3.0 .9	.4*	.3+
Across Areas	Mn 2.4 S.D. .7	2.8 .7	2.7 .8	.4*	.3+

* For difference between average grade at identification and average grade at completion of tutoring $p \geq .001$ level.

\+ For difference between average grade at identification and two years after completion of tutoring $p \geq .001$ level.

++ For difference between average grade at identification and two years after completion of tutoring $\geq .01$ level.

Table 4 shows the difference between the mean grade at identification and after two years without tutoring. The mean differences, all of which are statistically significant, were either .3 or .4 in the five areas and across areas. Thus, after two years without tutoring, the averages in reading, work habits, social habits, and across all five subject/skill areas were still significantly higher than the averages at identification, with the differences reaching the .001 confidence level. In mathematics and language, the differences were significant at the .01 level.

Figure 1 illustrates the mean differences in grades for Groups NT and RT. The numbers for Group NT are the differences between average grade at identification and currently. Note that for this group, the average grades decreased or were unchanged in all areas. For Group RT, the differences are those between average grades at identification and at completion of tutoring. For Group RT, the average grades increased in all areas.

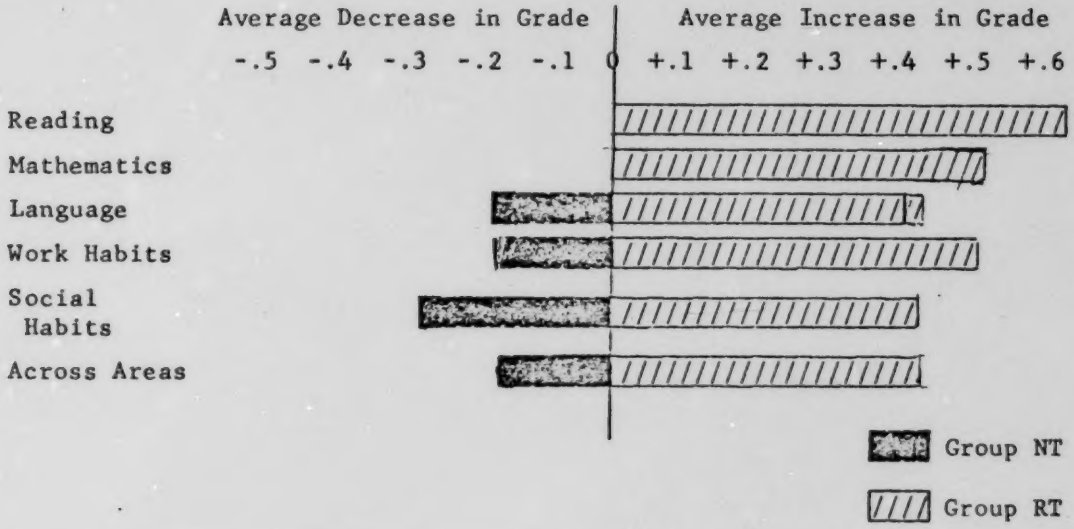

FIGURE 1. MEAN DIFFERENCES IN GRADES FOR GROUP NT (AT IDENTIFICATION AND CURRENTLY) AND GROUP RT (AT IDENTIFICATION AND AT COMPLETION OF TUTORING) IN FIVE SUBJECT/SKILL AREAS AND ACROSS AREAS.

To determine if student performance at the completion of tutoring was higher than might be expected if tutoring had not been received, the mean differences for each group were compared. For example, the mean difference of 0.0 in reading for Group NT was compared with the mean difference of +.6 in reading for Group RT. The t-test for significance of difference between independent groups indicated that in all subject/skill areas and across areas the performance of Group RT (which had received tutoring) was significantly higher than that of Group NT (which had received no tutoring). The differences were statistically significant at or beyond the .001 level.

As indicated earlier, average grades for Groups RT had increased significantly at the completion of tutoring, but had declined somewhat two years after tutoring was terminated. To determine if the performance found at completion of tutoring was different from that of untutored students, Groups RT and NT were again compared. The mean differences between average grades at identification and two years after completion of tutoring obtained for Group RT were compared with the mean differences obtained from Group NT. The differences for the two groups are illustrated in Figure 2. In all areas, the average grades decreased or remained unchanged for Group NT and increased for Group RT. The differences were found to be statistically significant at the .001 confidence level for all five subject/skill areas and across areas, indicating that the performance of the tutored group (RT) was significantly higher than that of the untutored group (NT).

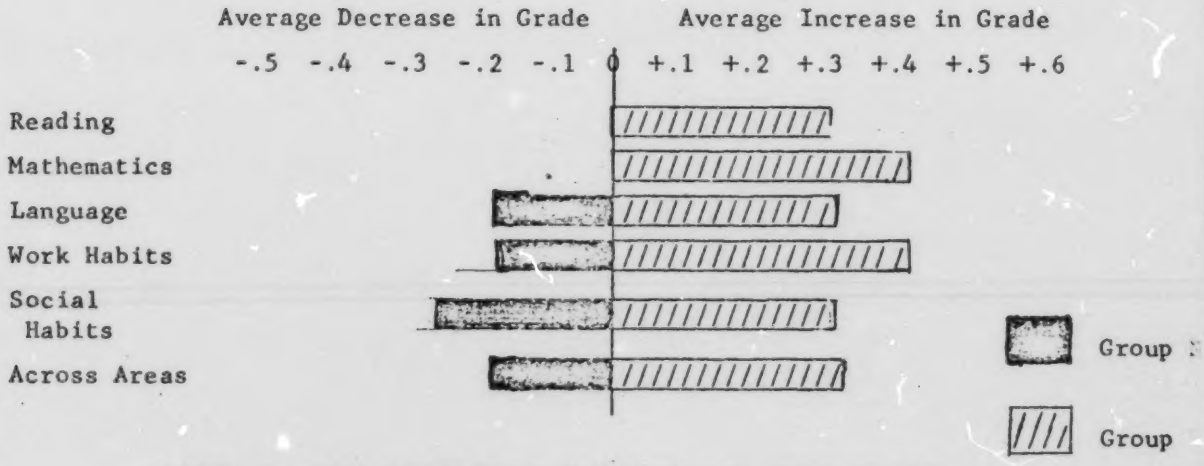

FIGURE 2. MEAN DIFFERENCES IN GRADES FOR GROUP NT (AT IDENTIFICATION AND CURRENTLY) AND GROUP RT (AT IDENTIFICATION AND TWO YEARS AFTER COMPLETION OF TUTORING) IN FIVE SUBJECT/SKILL AREAS AND ACROSS AREAS

Rate of Success/Nonsuccess

The average increase in grades presented in the preceding pages was one measure of tutoring effectiveness. The second measure used in this study was a count of students who improved from an unsuccessful to a "successful" classification. For purposes of this study, "success" was defined as a grade equivalent to, or greater than, 3. This category included the number grades of 3, 4, and 5 which were equivalent to the letter grades of C, B, and A, respectively. "Unsuccessful" was defined here as grades of 1 and 2, or F and D, respectively.

Grades for each subject/skill area were categorized as successful or unsuccessful before and after tutoring. The status of each student could thus be described in one of four ways, as indicated below:

(1) successful both before and after tutoring;

(2) unsuccessful both before and after tutoring;

(3) successful before tutoring, but unsuccessful after tutoring; and

(4) unsuccessful before tutoring, but successful after tutoring.

Some students who were successful at identification were included in the tutoring program. In some cases, such a student was having difficulty in one or more subject/skill areas and was tutored to improve performance in the areas of difficulty. In other cases, a student may have been successful as defined in this study, but working well below capacity.

Table 5 shows the number and percent of students who were successful and unsuccessful at identification for Groups NT and RT. The percent of successful were compared for the two groups. In each group, less than half were successful in the first four subject/skill areas, while more than half were successful in social skills.

TABLE 5. NUMBER AND PERCENT OF SUCCESSFUL AND UNSUCCESSFUL STUDENTS AT IDENTIFICATION FOR GROUPS NT AND RT

Subject/Skill		Group NT (N = 117) Successful	Group NT (N = 117) Unsuccessful	Group RT (N = 129) Successful	Group RT (N = 129) Unsuccessful
Reading	f *	40	77	52	77
	% **	(34.1)	(65.9)	(40.3)	(59.7)
Mathematics	f	40	77	41	88
	%	(34.1)	(65.9)	(31.7)	(68.3)
Language	f	51	66	55	74
	%	(43.5)	(56.5)	(42.6)	(57.4)
Work Habits	f	37	80	55	74
	%	(31.7	(68.3)	(42.6)	(57.4)
Social Habits	f	65	52	80	49
	%	(55.5)	(44.5)	(62.0)	(38.0)

* Frequency, or number of cases in each category.

** Percent of cases from each group.

The current success/nonsuccess status of initially unsuccessful students in Group NT (no tutoring) is presented in Table 6. The percent improving to a successful status ranged from 12.5 in work habits to 30.8 in social habits.

TABLE 6. CURRENT SUCCESS/NONSUCCESS STATUS OF INITIALLY UNSUCCESSFUL STUDENTS IN GROUP NT

Subject/Skill		Unsuccessful	Successful	Total *
Reading	f	62	15	77
	% **	(80.5)	(19.5)	
Mathematics	f	61	16	77
	%	(79.2)	(20.8)	
Language	f	53	13	66
	%	(80.3)	(19.7)	
Work Habits	f	70	10	80
	%	(87.5)	(12.5)	
Social Habits	f	36	16	52
	%	(69.2)	(30.8)	

* Most students were successful in some subject/skill areas and unsuccessful in others; therefore, the total number of initially unsuccessful varied among the areas.

** Percent of total initially unsuccessful students in each subject/skill area.

Comparable information for Group RT (received tutoring) is given in Table 7. This table shows the status of initially unsuccessful students two years after the completion of tutoring. The percent of students improving to a successful status in Group RT ranged from 43.4 in language to 59.2 in social habits.

TABLE 7. SUCCESS/NONSUCCESS STATUS OF INITIALLY UNSUCCESSFUL STUDENTS IN GROUP RT TWO YEARS AFTER THE COMPLETION OF TUTORING

Subject/Skill		Unsuccessful	Successful	Total
Reading	f	40	37	77
	%*	(51.9)	(48.1)	
Mathematics	f	49	39	88
	%	(55.6	(44.4)	
Language	f	42	32	74
	%	(56.7)	(43.3)	
Work Habits	f	39	35	74
	%	(52.7)	(47.3)	
Social Habits	f	20	29	49
	%	(40.8)	(59.2)	

* Percent of total unsuccessful in each area.

As indicated in Tables 6 and 7, a proportion of the initially unsuccessful students in each group attained a successful status. To determine if the percentages are significantly different for the two groups or if they could be due to chance, the chi square test was utilized. Results of that test indicated that for all five subject/skill areas, a significantly greater percent of students in Group RT improved to a successful status. Differences in percentages as large as that obtained are not likely to arise due to chance alone. In reading and work habits, the differences were significant at or beyond the .001 confidence level. For the remaining three areas, the differences were significant at the .01 level.

The performance of initially successful students from Groups NT and RT is described in Tables 8 and 9. Table 8 shows the current status of initially successful students in Group NT. In the first four subject/skill areas, no more than 40% of the untutored students remained successful. The percentages remaining successful in those four areas range from 27.1 in work habits to 40.4 in language.

TABLE 8. CURRENT SUCCESS /NONSUCCESS OF INITIALLY SUCCESSFUL STUDENTS IN GROUP NT

Subject/Skill		Successful	Unsuccessful	Total
Reading	f	16	24	40
	%*	(40.0)	(60.0)	
Mathematics	f	13	27	40
	%	(32.5)	(67.5)	
Language	f	20	31	51
	%	(40.4)	(59.6)	
Work Habits	f	10	27	37
	%	(27.1)	(72.9)	
Social Habits	f	37	28	65
	%	(57.0)	(43.0)	

* Percent of total successful in each area.

The success/nonsuccess status of initially successful students in Group RT is presented in Table 9 . The data indicate that at least half of these students maintained a successful status two years after the completion of tutoring. The percentages continuing to be successful range from 52.7 in language to 82.5 in social habits.

TABLE 9. SUCCESS/NONSUCCESS OF INITIALLY SUCCESSFUL STUDENTS IN GROUP RT TWO YEARS AFTER COMPLETION OF TUTORING

Subject/Skill		Successful	Unsuccessful	Total
Reading	f	31	21	52
	%*	(59.6)	(40.4)	
Mathematics	f	29	12	41
	%	(70.7)	(29.3)	
Language	f	31	16	55
	%	(52.7)	(47.3)	
Work Habits	f	42	13	55
	%	(56.5)	(43.3)	
Social Habits	f	66	14	80
	%	(82.5)	(17.5)	

* Percent of total successful in each area.

Comparison of Tables 8 and 9 suggests that a greater percentage of the initially successful students who were tutored remained successful, while those who were untutored showed a greater tendency to regress to lower grades. The chi square test was used to determine if a statistical difference in percentages did exist or if the differences could have been due to chance. Results of that test indicated that in four of the five areas, the percentages were significantly different. In mathematics, work habits, and social habits, the .001 confidence level was reached, while in language, the .01 level was attained. While the difference in percentage in reading was not significant at the level required in this study (.01), a trend was noted, suggesting that initially successful students who were tutored were more likely to maintain that status than those who had not been tutored.

In summary of success/nonsuccess, the data indicated that for all of the initially unsuccessful students, a statistically greater proportion of those who were tutored improved to a successful status compared with those who were not tutored. Similarly, for the initially successful students, a significantly greater proportion of those who were tutored remained successful in four of the five subject/skill areas. In the remaining area, a trend was noted, suggesting that a higher proportion from the tutored group remaining successful.

Conclusions: Effectiveness of the Regular Tutoring Program

In conclusion, the data related to this phase of the study indicated that neurologically handicapped students tutored in the regular tutoring program showed statistically significant increases in average

grades in the five subject/skill areas utilized in this study. Student grades declined somewhat in the two years after the completion of tutoring, but were still significantly higher (statistically) than those of similarly handicapped students who had not received tutoring.

When compared with untutored students, a significantly higher proportion of tutored students improved from an unsuccessful to a successful status. Of all the students who were successful at the time they entered the tutoring program, a significantly higher proportion of those who were tutored remained successful.

The results of statistical tests indicated that significant differences did appear to exist between students who had received tutoring and those who had not. In terms of average grades, the typical student who received tutoring attained grades that were about half a letter grade higher than those of the typical untutored student. The success rate of initially unsuccessful students who were tutored was about 48 percent compared to 20 percent for untutored students. For initially successful students who received tutoring, the success rate was approximately 64 percent compared to 39 percent for untutored students. It should be noted that the criteria for success required not only improvement, but improvement to a specific set of grades (A, B, or C). The analysis, therefore, did not consider those students improving from an F to a D, or from a C to B, C to A, or B to A. If all changes to a higher letter grade were considered to be success, the success rate would undoubtedly have been higher. This is supported by the data on average grades, which shows a consistent and reliable improvement in all five subject/skill areas for students in the regular tutoring program.

IV. RELATIVE EFFECTIVENESS OF REGULAR AND LANGUAGE CENTERED TUTORING APPROACHES

The second objective was met by comparing the present Columbus tutoring program for neurologically handicapped students with an experimental program that stresses the structure, use, and understanding of language. Included in this section is a description of student selection, the two tutoring approaches, data collection, and results. Conclusions based on the data are stated at the end of this section.

Selection of Students

The participants in this phase of the study were 134 students who had been identified at the beginning of the 1970-71 school year as neurologically handicapped. None had been enrolled in the tutoring program before. The students were placed into one of two groups, each consisting of 67 students. The first group (Group UNS) received tutoring as it is regularly offered in the Columbus School System. The second group (LANG) received tutoring which stressed the structure, use, and understanding of language. The treatment of the two groups is described in the following subsection.

To the extent possible, the two groups were grossly matched at the beginning of the 1970-71 school year on two variables: year of birth and IQ at referral. Tables 10 and 11 present the data related to year-of-birth and IQ for both groups.

TABLE 10. YEAR OF BIRTH OF STUDENTS TUTORED WITH THE REGULAR UNSTRUCTURED APPROACH (GROUP UNS) AND THE LANGUAGE-CENTERED APPROACH (GROUP LANG)

	Unstructured Approach	Language Centered Approach
Mode*	1962	1961
Range	1958-1964	1958-1964
N**	67	67

* Year of birth having the most frequent number of cases.

** Total number of cases in each group.

TABLE 11. IQ OF STUDENTS TUTORED WITH THE REGULAR UNSTRUCTURED APPROACH (GROUP UNS) AND THE LANGUAGE-CENTERED APPROACH (GROUP LANG)

	Unstructured Approach	Language Centered Apprcach
Mean*	99.1	102.1
Standard Deviation**	10.4	9.9
Range	80-124	83-129
N	67	67

* Arithmetic average.

** A measure of variability or dispersion.

Description of the Tutoring Approaches

Two different tutoring approaches were utilized in this study--an innovative, language-centered approach, and an unstructured approach currently used in the Columbus school system. The language-centered approach stressed the structure, use, and understanding of receptive and expressive language, and was utilized by 25 tutors. The tutors were trained in the use of tape recorders and specific teaching materials, the administration of tests, and the use of checklists. Inservice meetings were held biomonthly with tutors to provide opportunities for discussion of procedures, materials, and problems encountered in tutoring individual students. In addition, an experienced resource teacher provided training in the language-centered approach during regularly scheduled tutorial sessions.

To aid the tutors in assessing academic and behavior characteristics of students, special methods were used, including screening tests of auditory and language disabilities, a checklist of abilities and disabilities, and a rating scale to evaluate language abilities. The results of the assessment were used as the basis for devising and adjusting teaching plans of tutors. Specifically, results were used to adjust the amount of work for each student and to provide instruction at the level of achievement appropriate for each child. In addition, the information obtained by the assessment was made available to regular classroom teachers whose students were being tutored.

The second approach was termed unstructured as a means of describing the variety of methods used by the 50 tutors involved. Each tutor, after consulting classroom teachers, administrators, and various evaluations, assessed student characteristics without the use of special

assessment instruments which were provided to the tutors stressing language. The methods and techniques used varied among the tutors, each tutor using the method she considered appropriate for a student.

Data Collection

Data collection procedures for this phase of the study paralled those of the first phase (pages 7 and 8). With the exception of the items listed below, the same data were collected in the same manner for all students utilized in this study.

- Type of academic and behavioral disability. A number of behaviors specific to each of the five academic disabilities and four behavioral disabilities was presented in checklist form to tutors. Based on tutor judgments, written evaluations, and other information in the student records, one or more academic and behavioral disabilities were checked on the student data form. The checklist of disabilities is included in Appendix B.
- Degree of parent awareness. Three categories were established to describe parent awareness of a child's learning disability: considerable, partial, and minimal. A checklist of specific parent behaviors (e.g., acknowledges that a disability does exist) was prepared for each of the three degrees of awareness, and presented to tutors. Based on judgments of tutors, classroom teachers, and/or information contained in students records, one of the three choices was selected. See Appendix B for the checklist of parent behaviors.

- Student grades. Student grades, one of the two measures of performance, were recorded from the permanent student file as they appeared at the end of the 1969-70 school year and at the end of the 1970-71 school year after one year of tutoring. The same subject/skill areas were recorded as for the preceding phase of this study.
- Diagnostic test scores. Diagnostic tests were administered by individual tutors to all students at the beginning of the 1970-71 school year and after one school year of tutoring, with alternate forms used at the two testings. Scores were obtained in four areas: reading vocabulary, reading comprehension, mathematics facts, and mathematics concepts. Two different tests were used to obtain scores in reading vocabulary and comprehension. The Metropolitan Readiness Test was given to students entering the first grade. The Gates-MacGinitie Reading Tests were used to obtain measures of reading vocabulary and comprehension for all students in grades 1-6. The latter test also was used for students who were repeating the first grade. Primary Tests A, B, and C were used in grade levels 1, 2, and 3 respectively. Grades 4-6 were tested with Survey D.

Two different tests were used to obtain scores in mathematics facts and concepts. The California Acheivement Test, Lower Primary, was used with first and second grade students. For students in grade levels 3, 4, 5, and 6, the Wisconsin Contemporary Test of Elementary Mathematics was used.

All raw scores were converted to standard scores* to allow combining scores of different tests used for further statistical analysis.

Results

The relative effectiveness of the two tutoring approaches is based on three sources of data: diagnostic test scores, average grades, and success rate. These data are presented in the following paragraphs for each of the two groups.

Diagnostic Test Scores

Standard scores obtained on diagnostic tests given before and after one school year of tutoring are presented in Tables 12 and 13. Table 12 summarizes the data for the students tutored by the regular unstructured approach (Group UNS). This table shows that in three of the

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* Standard scores are for most purposes comparable, while the raw scores are incomparable. Standard scores are derived from raw scores. A distribution of standard scores has a mean of 50 and a standard deviation of 10. All the properties of the original distribution of raw scores are duplicated in the distribution of these standard scores.

TABLE 12. STANDARD TEST SCORES BEFORE AND AFTER TUTORING FOR STUDENTS RECEIVING UNSTRUCTURED TUTORING

Subject	N +	Before Tutoring Mean	Before Tutoring S.D.+++	After Tutoring Mean	After Tutoring S.D.	Mean Difference
Reading Vocabulary	63++	45.3	8.5	44.9	9.3	-.4
Reading Comprehension	63++	44.0	10.0	45.2	9.3	1.2
Mathematics Facts	67	42.7	10.8	48.8	8.9	6.1*
Mathematics Concepts	67	45.4	10.2	48.2	11.0	2.8

* $p \geq .001$.

+ Number of students for which data were used.

++ The Metropolitan Readiness Test yields no set of scores comparable to reading vocabulary and comprehension. Consequently, no scores were used for the four first grade students who took that test.

+++ Standard deviation (S.D.) is a measure is dispersion or variability of the test scores. The larger the standard deviation, the more widely spread or dispersed the scores.

test areas -- reading comprehension, mathematics facts, and mathematics concepts, the mean test scores increased by 1.2, 6.1, and 2.8 points, respectively. Of these three areas, the only increase that was statistically significant was for mathematics facts. The difference in that area was significant at the .001 level, indicating that the difference was so large that it was unlikely to arise by chance above.

The mean score in reading vocabulary decreased slightly (.4 of a point) between the two testings. However, the decrease in reading vocabulary was not statistically significant.

Test scores for the students tutored by the language-centered approach (Group LANG) are presented in Table 13. As shown in the table, the mean test score in all four areas increased after one school year of tutoring. In reading vocabulary and comprehension the increases were 1.4 and 3.2 points, respectively. The gains in these two areas of reading were not statistically significant.

Table 13 also shows that greater increases were achieved in the area of mathematics than in reading. The mean scores in mathematics facts and mathematics concepts increased by 7.5 and 6.9 points, respectively. The increases recorded for both mathematics areas were large enough to be statistically significant at the .001 confidence level, indicating that gains that large were not likely to have arisen by chance alone.

TABLE 13. STANDARD TEST SCORES BEFORE AND AFTER TUTORING FOR STUDENTS RECEIVING LANGUAGE CENTERED TUTORING

Subject	N+	Before Tutoring		After Tutoring		Mean Difference
		Mean	S.D.+++	Mean	S.D.	
Reading Vocabulary	64++	48.5	8.3	49.9	8.8	1.4
Reading Comprehension	64++	45.5	7.9	48.7	7.6	3.2
Mathematics Facts	67	45.6	8.8	53.1	9.2	7.5*
Mathematics Concepts	67	45.6	8.4	52.5	10.6	6.9*

* $p \geq .001$.

\+ Number of students for which data were used.

++ The Metropolitan Readiness Test yields no set of scores comparable to reading vocabulary and comprehension. Consequently, no scores were used for the three first grade students tested with that form.

+++ Standard deviation.

To compare the performance of the groups tutored by the two different approaches, the mean difference for each test area for Group UNS was compared with the mean difference in the same test area for Group LANG. For example, the mean difference of -.4 obtained in reading vocabulary for Group UNS was compared with 1.4, the mean difference in reading vocabulary for Group LANG. The t-test for independent groups was used to test for significant differences between the two values. Results of the t-tests indicated that the two groups produced statistically similar changes in test scores in all four test areas. That is, one tutoring approach did not produce changes in test scores that were significantly different from those produced by the other approach.

Average Grades

The second measure of student performance investigated was average grades. Table 14 shows the average grades (arithmetic means) for each of the five subject/skill areas and across areas for students tutored with the unstructured approach (Group UNS). The average grade across areas represents the mean value of grades for all 67 students across all five subject/skill areas. It can be seen that the average grades improved in all five subject/skill areas, with the increase ranging from .1 of a letter grade in social habits to .6 of a letter grade in reading. The results of t-tests indicated that in reading,

mathematics, work habits, and across areas, the increases in average grades were statistically significant at the .001 level. The increase in average grade for language was significant at the .01 level. Thus, the increases for those five areas were statistically reliable and consistent, and were so large that they were unlikely to have arisen by chance only.

The only subject/skill area in which the average grades were not statistically different was social habits. In that area, the average grade before tutoring was higher than in any other area, and did not change significantly.

TABLE 14. AVERAGE GRADE IN FIVE SUBJECT/SKILL AREAS FOR THE UNSTRUCTURED TUTORING GROUP BEFORE AND AFTER ONE SCHOOL YEAR OF TUTORING (N = 67).

Subject	Before Tutoring		After Tutoring		Mean Difference
	Mean	S.D.	Mean	S.D.	
Reading	2.1	.8	2.7	1.0	.6*
Mathematics	2.3	.9	2.9	.9	.6*
Language	2.5	.8	2.8	.8	.3**
Work Habits	2.3	.8	2.7	.8	.4*
Social Habits	2.8	.8	2.9	.7	.1
Across Areas	2.5	.6	2.8	.6	.3*

* $p \geq .001$.

** $p \geq .01$.

Table 15 presents the average grade data for students tutored by the language centered approach (Group LANG). The table shows that the average grade increased in each of the five subject/skill areas, and that all increases were statistically significant. The increases ranged from .2 of a letter grade in language and social habits to .6 of a letter grade in mathematics. The increases in reading, mathematics, and work habits were significant at the .001 level, while those in language, social habits, and across all areas were significant at the .01 level. Thus, the differences in all areas were reliable and consistent, indicating that it is unlikely that they could have occurred by chance.

TABLE 15. AVERAGE GRADES IN FIVE SUBJECT/SKILL AREAS FOR THE LANGUAGE CENTERED TUTORING GROUP BEFORE AND AFTER ONE SCHOOL YEAR OF TUTORING (N = 67).

	Before Tutoring		After Tutoring		
Subject	Mean	S.D.	Mean	S.D.	Difference
Reading	2.4	.8	2.8	.6	.4*
Mathematics	2.2	.8	2.8	.6	.6*
Language	2.5	.8	2.7	.6	.2**
Work Habits	2.3	.7	2.8	.8	.5*
Social Habits	2.8	.8	3.1	.7	.2**
Across Areas	2.4	.5	2.8	.5	.4**

* $p \geq .001$.
** $p \geq .01$.

To determine if the gains produced by one tutoring approach were statistically different from the gains produced by the other tutoring approach, the mean difference in each subject/skill area for Group UNS

was compared with the respective mean difference for Group LANG. The t-tests for independent groups indicated that differences between the groups were not reliable, i.e., the gains associated with the two tutoring approaches were not statistically different.

Success Rate

As discussed above, the overall changes in test scores and average grades were two measures of tutoring effectiveness. A third measure was the success rate, the proportion of students who improved from an "unsuccessful" to a "successful" classification. As previously noted, success was defined in this study as a grade equivalent to or greater than 3. "Success", therefore, included the number grades of 3, 4, and 5 which were equivalent to the letter grades of C, B. and A, respectively. Grades of 1 and 2, equivalent to F and D letter grades, respectively, were considered to be unsuccessful.

Grades for each subject/skill area were categorized as successful or unsuccessful before and after tutoring. The status of each student could thus be described in one of four ways:

(1) successful both before and after tutoring;
(2) unsuccessful both before and after tutoring;
(3) successful before tutoring, but unsuccessful after tutoring; and
(4) unsuccessful before tutoring, but successful after tutoring.

Some students who were successful at identification were included in the tutoring program. In some cases, a student was having difficulty in at least one subject/skill area and was tutored to improve student performance in the areas of difficulty. In other cases, a student may have been successful as defined in the study, but working well below capacity.

Table 16 presents the number and percent of students from each group who were successful and unsuccessful at identification. Inspection of Table 16 indicates that in mathematics, language, work habits, and social habits the percent of successful students was similar for the two groups. In mathematics, for example, 40.2 percent of those tutored with the regular approach were successful, while 41.7 percent of those tutored with the language-centered approach were successful. In the remaining area, reading, a higher percent of the students in Group LANG were initially successful.

Table 17 presents, for each group, the success rate of students who were unsuccessful at identification for the five subject/skill areas. A comparison of the percent that improved to a successful status after tutoring indicates a close similarity between the groups. Specifically, the success rate in Group UNS varies from 53.1 to 76.1 percent, and for Group LANG the success rate varies from 55.5 to 68.1. Results of chi square tests confirmed that no statistical differences existed between the success rates of the two groups. Thus, there is no reason to believe that the two tutoring approaches were different in their effect on initially unsuccessful students.

Table 18 presents the success rate in five subject/skill areas for initially successful students in Groups UNS and LANG. An inspection of each group indicates that in all areas, about 80 to 90 percent of the students who were successful before tutoring continued to be successful after tutoring. The similarity of the two groups was confirmed by the chi square test which showed no statistically significant difference between the two tutoring approaches.

TABLE 16. NUMBER AND PERCENT OF STUDENTS TUTORED WITH THE UNSTRUCTURED APPROACH AND THE LANGUAGE-CENTERED APPROACH WHO WERE SUCCESSFUL AND UNSUCCESSFUL AT IDENTIFICATION, BY SUBJECT/SKILL AREA

Subject/Skill		Unstructured Approach (N=67)		Language-Centered Approach (N=67)	
		Successful	Unsuccessful	Successful	Unsuccessful
Reading	f*	20	47	31	36
	%**	(29.8)	(70.2)	(46.2)	(53.8)
Mathematics	f	27	40	28	39
	%	(40.2)	(59.8)	(41.7)	(58.3)
Language	f	39	28	40	27
	%	(58.3)	(41.7)	(59.8)	(40.2)
Work Habits	f	26	41	22	45
	%	(38.8)	(61.2)	(32.8)	(67.2)
Social Habits	f	46	21	45	22
	%	(68.6)	(31.4)	(67.1)	(32.9)

* Frequency, or number of occurrences.

** Percent of total (67) for each group.

TABLE 17. SUCCESS RATE OF INITIALLY UNSUCCESSFUL STUDENTS TUTORED WITH THE UNSTRUCTURED APPROACH AND THE LANGUAGE-CENTERED APPROACH BY SUBJECT/SKILL AREA

Subject/Skill		Unstructured Approach			Language Centered Approach		
		Successful	Unsuccessful	Total	Successful	Unsuccessful	Total
Reading	f*	25	22	47	21	15	36
	%**	(53.1)	(46.9)		(58.3)	(41.7)	
Mathematics	f	24	16	40	25	14	39
	%	(60.0)	(40.0)		(64.1)	(35.9)	
Language	f	15	13	28	15	12	27
	%	(53.5)	(6.5)		(55.5)	(44.5)	
Work Habits	f	20	21	41	27	18	45
	%	(48.7)	(51.3)		(60.0)	(40.0)	
Social Habits	f	16	5	21	15	7	22
	%	(76.1)	(23.9)		(68.1)	(31.9)	

* Frequency, or number of occurrences.

** Percent of total who were initially unsuccessful for each group.

TABLE 18. SUCCESS RATE OF INITIALLY SUCCESSFUL STUDENTS TUTORED WITH THE UNSTRUCTURED APPROACH AND THE LANGUAGE-CENTERED APPROACH, BY SUBJECT/SKILL AREA

Subject/Skill		Unstructured Approach			Language-Centered Approach		
		Successful	Unsuccessful	Total	Successful	Unsuccessful	Total
Reading	f*	17	3	20	27	4	31
	%**	(85.0)	(15.0)		(87.0)	(13.0)	
Mathematics	f	23	4	27	24	4	28
	%	(85.1)	(14.9)		(85.7)	(14.3)	
Language	f	33	6	39	32	8	40
	%	(91.6)	(8.4)		(80.0)	(20.0)	
Work Habits	f	22	4	26	17	5	22
	%	(84.6)	(15.4)		(77.2)	(22.8)	
Social Habits	f	38	8	46	41	4	45
	%	(82.6)	(17.4)		(91.1)	(8.9)	

* Frequency, or number of occurrences.

** Percent of total who were initially successful for each group.

To summarize the analysis of the success rate measure for the students tutored by the unstructured and language-centered approaches, there did not appear to be any significant statistical difference between the two tutoring approaches. That is, the two approaches appeared to produce equivalent results with regard to success rate.

Conclusions: Relative Effectiveness of The Unstructured and The Language-Centered Tutoring Approach

The study findings which follow are the basis for conclusions regarding the effectiveness of the unstructured and language-centered tutoring approaches.

It appears that both the unstructured tutoring approach presently used in the Columbus school system and the experimental language-centered program produced significant increases (ranging from .2 to .6 of a letter grade) in average grades. A comparison of the increases associated with one approach with increases found for the other approach indicated that no significant differences existed between the two groups in any of the subject/skill areas.

With regard to the success rate associated with each tutoring approach, the success rate for initially unsuccessful students tutored by the unstructured approach varied from 48.7 to 76.1 percent. For the group of students tutored by the language-centered approach, the success rate for initially unsuccessful students varied from 58.3 to 68.1 percent. No significant statistical difference was found to exist in the success rate between the two tutoring approaches. The success rate for initially successful students tutored by the regular approach varied from 82.6 per-

cent to 91.6 percent, while the success rate of students tutored by the language-centered approach varied from 77.2 to 91.1 percent. The two tutoring approaches were not significantly different with regard to success rate of initially successful students.

The findings showed that test scores in reading vocabulary and comprehension did not increase significantly for either tutoring approach. The differences in mean scores before and after tutoring were not statistically different for the two tutoring approaches. Test scores in mathematics facts increased significantly for both the tutoring groups while scores in mathematics concepts increased significantly only for the language-centered group. A comparison of the increases for the students tutored by the language-centered approach with those for students tutored by the regular approach indicated no statistically significant differences between the two approaches in the two areas of mathematics.

Based on the preceding findings, it is concluded that, in general, the unstructured tutoring approach and the language-centered approach did not produce statistically significant differences in student performance as measured by this study. It is possible, however, that one or the other approach may have produced changes in teacher-student, teacher-teacher, or student-student relations that were not recorded in this study. Thus, it is important that educators consider the total impact of each approach before dismissing either one in part or entirely.

V. CHARACTERISTICS OF SUCCESSFUL STUDENTS

The third study objective was met by examining the relationship of three factors -- IQ, type of disability, and parental awareness of a disability -- to success at the completion of tutoring. Data for all students who received tutoring (Groups RT, UNS, and LANG) were used in this phase of the study.

The three parts of this section describe the results associated with each of the three factors, and state conclusions based on the findings.

Relation of IQ to Success

It has been suggested that students within a particular IQ category may be more likely to benefit from tutoring than students in other IQ categories. The categories specifically under investigation in this are "average" (90+ IQ points) and "below average" (80-89 IQ points).

All tutored students included in this study were placed into one of these two IQ categories. Of the total of 263 students, 48 were in the below average IQ category and 215 had IQs of 90 or above. The performance of students in each of the two IQ groups was classified with regard to success/nonsuccess at identification and at completion of tutoring. Performance measures recorded for group UNS two years after the completion of tutoring were not considered in this phase of the study.

For each of the two IQ categories Table 19 presents the number who were successful and unsuccessful at identification. The table shows that in the three academic areas, reading, mathematics, and language, a

somewhat higher proportion of average IQ students (compared with those of below average IQ) were initially successful. In reading, for example, 41.4 percent in the average IQ category were successful compared with 29.1 percent of the below average IQ category. In the non-academic areas of work habits and social habits, however, the percent of those successful was similar for the two IQ categories.

TABLE 19. SUCCESS/NONSUCCESS OF NEUROLOGICALLY HANDICAPPED STUDENTS AT IDENTIFICATION BY IQ CATEGORY

		Below Average IQ (N=48)		Average/Above IQ (N=215)	
		Unsuccessful	Successful	Unsuccessful	Successful
Reading	f*	34	14	126	89
	%**	(70.9)	(29.1)	(58.6)	(41.4)
Mathematics	f	36	12	131	84
	%	(75.0)	(25.0)	(60.9)	(39.1)
Language	f	30	18	99	116
	%	(62.5)	(37.5)	(46.0)	(54.0)
Work Habits	f	28	20	132	81
	%	(58.3)	(41.7)	(61.3)	(38.7)
Social Habits	f	17	31	75	140
	%	(35.4)	(64.6)	(34.8)	(65.2)

* Frequency, or occurrence.

** Percent of cases in each IQ category.

Table 20 presents, for the two IQ categories, the status of initially unsuccessful students at the completion of tutoring. Inspection of Table 20 reveals that for reading, mathematics, language, and work habits less than 50 percent (30.6 to 46.7) of the below average IQ students achieved a successful status, while more than 50 percent (53.6 to 61.2) of the average IQ students achieved a successful status. The chi square test was used to determine if the proportions of successful and unsuccessful students were statistically different for the two categories. Results of this test indicated that the proportions were statistically different in the area of mathematics ($p \geq .01$), but were not statistically different in reading, language, work habits, and social habits. That is, for initially unsuccessful students the success rate was significantly different only for mathematics, with the higher rate achieved by the average IQ student.

The status of initially successful students at the completion of tutoring is shown in Table 21 for the two IQ categories. The table shows that no distinct pattern emerged when the percentages of students who were successful at completion of tutoring were compared for each IQ category. That is, there is no indication that one IQ category had a consistently higher percent of students who maintained a successful status. The apparent lack of relationship between IQ category and success/nonsuccess is confirmed in the results of the chi square test. This test showed that the proportions of students who were successful and unsuccessful were not significantly different between the two IQ categories. A trend was

TABLE 20. SUCCESS/NONSUCCESS STATUS OF INITIALLY UNSUCCESSFUL STUDENTS AT THE COMPLETION OF TUTORING BY IQ CATEGORY

		Below Average IQ (N=48)			Average IQ (N=215)		
		Unsuccessful	Successful	Total	Unsuccessful	Successful	Total
Reading	f*	19	15	34	49	77	126
	%**	(55.5)	(44.5)		(38.8)	(61.2)	
Math	f	25	11	36	53	78	131
	%	(69.4)	(30.6)		(40.4)	(59.6)	
Language	f	16	14	30	46	53	99
	%	(53.3)	(46.7)		(46.4)	(53.6)	
Work Habits	f	15	13	28	55	77	132
	%	(53.5)	(46.5)		(41.6)	(58.4)	
Social Habits	f	5	12	17	23	52	75
	%	(29.3)	(70.7)		(30.6)	(69.4)	

* Frequency, or occurrence.

** Percent of total unsuccessful in each IQ category.

TABLE 21. SUCCESS/NONSUCCESS STATUS OF INITIALLY SUCCESSFUL STUDENTS AT THE COMPLETION OF TUTORING BY IQ CATEGORY

		Below Average IQ			Average IQ		
		Unsuccessful	Successful	Total	Unsuccessful	Successful	Total
Reading	f*	9	5	14	43	46	89
	%**	(64.2)	(35.8)		(48.3)	(51.7)	
Mathematics	f	7	5	12	69	15	84
	%	(58.3)	(41.7)		(82.1)	(17.9)	
Language	f	13	5	18	95	21	116
	%	(72.2)	(27.8)		(81.8)	(18.2)	
Work Habits	f	18	2	20	68	13	81
	%	(90.0)	(10.0)		(83.9)	(16.1)	
Social Habits	f	26	2	31	122	18	140
	%	(83.8)	(16.2)		(87.1)	(12.9)	

* Frequency, or occurrence.

** Percent of total successful in each IQ category.

noted in mathematics, however, suggesting that initially successful students of average IQ were more likely to remain successful after tutoring than those of below average IQ.

To summarize the relationships of IQ and rate of success for tutored students, the data indicated that for reading, language, work habits, and social habits, no statistically significant differences existed between below average and average IQ with regard to success rate. This indicates that, in those four areas, students with below average IQs were as likely to achieve a successful status as those students with average IQs. In mathematics, however, a statistically significant difference was found, indicating that initially unsuccessful students with an average IQ were more likely to achieve a successful status. In the same subject area for initially successful students, no significant difference was found between the two IQ categories.

It should be noted that the analysis was concerned specifically with students who improved to a "C" letter grade or better, not with degree of improvement. Thus, it is possible that students in one IQ category could have shown greater increases in performance than those in the other IQ category. Also, evaluation of student performance two or more years after completion of tutoring was not within the scope of this study.

Relation of Type of Disability to Success

A second factor, type of disability, was investigated to determine its relationship to student success. As indicated earlier in this report, two types of disabilities -- academic and behavioral -- were recorded for each student. The data analysis is presented separately for these two types of disabilities.

Academic Disability. Five categories of academic disabilities were used in this study: small motor, visual, auditory, oral language,

and written language.* The number and percent of the total number of students having each disability is presented in Table 22.

TABLE 22. OCCURRENCE OF FIVE CATEGORIES OF ACADEMIC DISABILITY FOR ALL STUDENTS RECEIVING TUTORING (N=263)

Disability	Frequency	Percent
Small Motor	178	67.9
Visual	188	71.5
Auditory	205	77.9
Oral Language	186	70.7
Written Language	228	86.6

It is apparent from Table 22 that most students exhibited more than one type of disability. Inspection of the data revealed that a total of 20 different academic disability patterns were present among the 263 students investigated in this phase of the study. Many patterns were found to have fewer than ten cases. These patterns were disregarded, leaving five patterns which were further analyzed. The remaining five patterns and the number of students demonstrating them are listed below.

* The five disabilities, defined in terms of specific symptoms, are defined in Appendix B.

(1) SVAOW: Small motor, visual, auditory, oral language, written language (87)

(2) SAOW: Small motor, auditory, oral language, written language (22)

(3) VAOW: Visual, auditory, oral language, written language (25)

(4) AOW: Auditory, oral language, written language (31)

(5) SVW: Small motor, visual, written language (36).

The success/nonsuccess status of students with each disability pattern at identification is described in Table 23. The chi square test was utilized to determine if the proportions of successful and unsuccessful students were statistically different. In the subject/skill areas of mathematics, language, work habits, and social habits, no significant differences were found between disability patterns. This indicates that any particular disability pattern was as debilitating as any other pattern for the four subject/skill areas stated. In the fifth subject area, reading, the results of the chi square test showed that a significant difference existed between disability patterns. Inspection of the success rates associated with each pattern reveals that the highest rate (63.8%) at identification was associated with the SVW pattern, indicating that this pattern was the least debilitating to reading. In determining the pattern associated with the lowest success rate, it was observed that two patterns, SVAOW and VAOW, could be selected. The success rates for Patterns SVAOW (25.2%) and VAOW (28.0%) indicated that these two patterns were the most debilitating to reading.

TABLE 23. INITIAL SUCCESS/NONSUCCESS STATUS OF 201 NEUROLOGICALLY HANDICAPPED STUDENTS FOR FIVE ACADEMIC DISABILITY PATTERNS *

		PATTERN SVAOW (N = 87)		PATTERN SAOW (N = 22)		PATTERN VAOW (N = 25)		PATTERN AOW (N = 31)		PATTERN SVW (N = 36)	
		Successful	Unsuccessful	Successful	Unsuccessful	Successful	Unsuccessful	Successful	Unsuccessful	Successful	Unsuccessful
Reading	f**	22	65	8	14	7	18	13	18	23	13
	%***	(25.2)	(74.8)	(36.3)	(63.7)	(28.0)	(72.0)	(41.9)	(58.1)	(63.8)	(36.2)
Mathematics	f	26	61	8	14	9	16	10	21	13	23
	%	(29.8)	(70.2)	(36.3)	(63.7)	(36.0)	(64.0)	(32.2)	(67.8)	(36.1)	(63.9)
Language	f	32	55	8	14	11	14	18	13	19	17
	%	(36.7)	(63.3)	(36.3)	(63.7)	(44.0)	(56.0)	(58.1)	(41.9)	(52.7)	(47.3)
Work Habits	f	24	63	6	16	12	13	14	17	12	24
	%	(27.5)	(72.5)	(27.2)	(72.8)	(48.0)	(52.0)	(45.1)	(54.9)	(33.3)	(66.7)
Social Habits	f	48	39	16	6	18	7	19	12	18	18
	%	(55.1)	(44.9)	(72.8)	(27.2)	(72.0)	(28.0)	(61.2)	(38.8)	(50.0)	(50.0)

* SVAOW: small motor, visual, auditory, oral language, written language.
SAOW: small motor, auditory, oral language, written language.
VAOW: visual, auditory, oral language, written language.
AOW: auditory, oral language, written language.
SVW: small motor, visual, written language.

** Frequency, or number of cases having each pattern.
*** Percent of cases having each pattern.

The performance of initially unsuccessful students at the completion of tutoring is presented for each disability pattern in Table 24. In four of the five subject/skill areas - reading, mathematics, language, and social habits -- no statistically significant differences were found between the proportions of successful students in each disability patterns. In the area of work habits, however, a significant difference between disability patterns was found. Inspection of the percentages of students who achieved success for each disability pattern indicated that the lowest success rate (38.1%) in work habits was associated with Pattern SVAOW, while Pattern VAOW had a somewhat higher rate (46.2%). This indicates that initially unsuccessful students who had these patterns of disability were the least likely to achieve success in work habits after tutoring. The highest success rates (76.5% and 70.9%) in work habits were associated with Patterns AOW and SVW, respectively. This indicates that initially unsuccessful students who had these disability patterns were the most likely to be successful in work habits after tutoring.

Table 25 presents the status of initially successful students at the completion of tutoring for each disability pattern. The table shows that well over half the students who received tutoring remained successful in all subject/skill areas after tutoring, regardless of the type of disability pattern present. Results of the chi square test showed that no significant differences existed between the disability patterns with regard to success rate for any of the five subject/skill areas.

TABLE 24. SUCCESS/NONSUCCESS STATUS OF INITIALLY UNSUCCESSFUL STUDENTS AT COMPLETION OF TUTORING FOR FIVE ACADEMIC DISABILITY PATTERNS*

		PATTERN SVAOW		PATTERN SAOW		PATTERN VAOW		PATTERN AOW		PATTERN SVW	
		Successful	Unsuccessful	Successful	Unsuccessful	Successful	Unsuccessful	Successful	Unsuccessful	Successful	Unsuccessful
Reading	f**	32	33	10	4	7	11	13	5	8	5
	%***	(49.3)	(50.7)	(71.5)	(28.5)	(38.9)	(61.1)	(72.3)	(27.7)	(61.6)	(38.4)
Mathematics	f	25	36	9	5	8	8	8	13	15	8
	%	(41.0)	(59.0)	(64.3)	(35.7)	(50.0)	(50.0)	(38.1)	(61.9)	(65.3)	(34.7)
Language	f	27	28	6	8	6	8	6	7	12	5
	%	(49.1)	(50.9)	(42.9)	(57.1)	(42.9)	(57.1)	(46.2)	(53.8)	(70.6)	(29.4)
Work Habits	f	24	39	10	6	6	7	13	4	17	7
	%	(38.1)	(61.9)	(62.5)	(37.5)	(46.2)	(53.8)	(76.5)	(23.5)	(70.9)	(29.1)
Social Habits	f	24	15	4	2	5	2	7	5	15	3
	%	(61.6)	(38.4)	(66.7)	(33.3)	(71.5)	(28.5)	(58.4)	(41.6)	(83.4)	(16.6)

* SVAOW: small motor, visual, auditory, oral language, written language.
SAOW: small motor, auditory, oral language, written language.
VAOW: visual, auditory, oral language, written language.
AOW: auditory, oral language, written language.
SVW: small motor, visual, written language.

** Frequency, or number of cases having each pattern.

*** Percent of cases having each pattern.

TABLE 25. SUCCESS/NONSUCCESS STATUS OF INITIALLY SUCCESSFUL STUDENTS AT COMPLETION OF TUTORING FOR FIVE ACADEMIC DISABILITY PATTERNS*

		PATTERN SVAOW		PATTERN SAOW		PATTERN VAOW		PATTERN AOW		PATTERN SVW	
		Successful	Unsuccessful	Successful	Unsuccessful	Successful	Unsuccessful	Successful	Unsuccessful	Successful	Unsuccessful
Reading	f**	16	6	6	2	6	1	10	3	23	0
	%***	(72.7)	(27.3)	(75.0)	(25.0)	(85.7)	(14.3)	(76.9)	(23.1)	(100.0)	(0.0)
Mathematic	f	17	9	5	3	5	4	8	2	12	1
	%	(65.3)	(34.7)	(62.5)	(37.5)	(55.5)	(44.5)	(80.0)	(20.0)	(92.3)	(7.7)
Language	f	19	13	8	0	7	4	15	3	15	4
	%	(59.3)	(40.7)	(100.0)	(0.0)	(63.6)	(36.4)	(83.3)	(16.7)	(78.9)	(21.1)
Work Habits	f	17	7	5	1	11	1	12	2	10	2
	%	(70.8)	(29.2)	(83.3)	(16.7)	(91.6)	(8.4)	(85.7)	(14.3)	(83.3)	(16.7)
Social Habits	f	35	13	16	0	15	3	18	1	16	2
	%	(72.9)	(27.1)	(100.0)	(0.0)	(83.3)	(16.7)	(94.7)	(5.3)	(88.8)	(11.2)

* SVAOW: small motor, visual, auditory, oral language, written language.
SAOW: small motor, auditory, oral language, written language.
VAOW: visual, auditory, oral language, written language.
AOW: auditory, oral language, written language.
SVW: small motor, visual, written language.

** Frequency, or number of cases having each pattern.

*** Percent of cases having each pattern.

When a comparison of the success rates for each disability pattern is made for Tables 23,24, and 25, it can be seen that in most cases the SVAOW pattern was associated with the lowest success rate, and Pattern SVW most frequently reflected the success rate. Thus, there appeared to be indications of a consistency or pattern among the disabilities. The data available in this study do not provide a means for analyzing the contribution of each specific disability. However, it appears that the auditory disability or the combination of the auditory with the visual disability resulted in decreased likelihood of success.

Behavioral Disability. Four categories of behavioral disabilities were used in this study: hyperactivity, hypoactivity, emotional overlay, and distractibility. The number and the percent of the total number of students exhibiting each disability is presented in Table 26. As in the case of the academic disabilities, it is

TABLE 26. OCCURRENCE OF FOUR CATEGORIES OF BEHAVIORAL DISABILITY FOR ALL STUDENTS RECEIVING TUTORING (N=263)

Disability	Frequency	Percent
Hyperactivity	147	55.9
Hypoactivity	100	38.4
Emotional Overlay	161	61.2
Distractibility	233	88.5

apparent from the table that most students had a pattern of disabilities rather than only on specific disability. Inspection of the data indicated that seven different behavioral disability patterns were present among the 263 students, with some patterns exhibited by fewer than ten students. For purposes of analysis, low frequency patterns were disregarded, leaving four patterns which involved 223 of 263 students. The four patterns selected for further analysis and the frequency with which each occurred is listed below.

(1) HEED: Hyperactivity, emotional overlay, distractibility (95)

(2) HOED: Hypoactivity, emotional overlay, distractibility (53)

(3) HED: Hyperactivity, distractibility (46)

(4) HOD: Hypoactivity, distractibility (29).

Table 27 presents the distribution of students among the four behavioral disability patterns and, for each pattern, the number and percent who were successful and unsuccessful at identification. The chi square test was used to determine if the proportions of successful and unsuccessful students were statistically different between the disability patterns. Statistically significant differences were found between patterns in the areas of work habits and social habits. Inspection of the percentages of students successful in work habits at identification revealed that the highest percent (55.1%) was associated with the HOD pattern, while a slightly lower percent (50.9%) exhibiting Pattern HOED were successful. This indicates that Patterns HOD and HOED were the least debilitating of the four patterns in work habits. The lowest percent (21.0) of students successful

TABLE 27. INITIAL SUCCESS/NONSUCCESS STATUS OF 223 NEUROLOGICALLY HANDICAPPED STUDENTS FOR FOUR BEHAVIOR DISABILITY PATTERNS

		Pattern HEED (N=95)		Pattern HOED (N=53)		Pattern HED (N-46)		Pattern HOD (N=29)	
		Successful	Unsuccessful	Successful	Unsuccessful	Successful	Unsuccessful	Successful	Unsuccessful
Reading	f*	36	59	19	34	17	29	10	19
	%**	(37.8)	(62.2)	(35.8)	(64.2)	(36.9)	(63.1)	(34.4)	(65.6)
Mathematics	f	23	72	22	31	21	25	11	18
	%	(24.2)	(75.8)	(41.5)	(58.5)	(45.6)	(54.4)	(37.9)	(62.1)
Language	f	38	57	27	26	24	22	17	12
	%	(40.0)	(60.0)	(50.9)	(49.1)	(52.1)	(47.9)	(58.6)	(41.4)
Work Habits	f	20	75	27	26	18	28	16	13
	%	(21.0)	(79.0)	(50.9)	(49.1)	(39.1)	(60.9)	(55.1)	(44.9)
Social Habits	f	42	53	37	16	31	15	28	4
	%	(44.2)	(55.8)	(69.8)	(30.2)	(67.3)	(32.7)	(96.5)	(3.5)

* Frequency, or number of cases for each pattern.

** Percent of cases for each pattern.

in work habits was associated with the HEED pattern, indicating that this pattern was the most debilitating. In the area of social habits, Table 27 shows that students exhibiting Pattern HOD had an obviously higher percent (96.5) of success at identification, indicating that this behavior pattern was less delibitating than the others in social habits. The pattern associated with the lowest percent (44.2) of students initially successful in social habits was Pattern HEED, indicating that this pattern was the most debilitating.

Performance at the completion of tutoring is presented in Table 28 for those students who were unsuccessful at identification. The results of chi square tests showed that significant differences existed between behavioral disability patterns in three areas: reading, mathematics, and work habits. In those three areas, Pattern HEED was associated with the lowest success rate of the four patterns. The highest success rate for initially unsuccessful students was associated with Pattern HOD for reading, and with Pattern HED for mathematics and work habits.

The performance of initially successful students at completion of tutoring is presented in Table 29 . Results of the chi square tests showed that in reading, mathematics, language, and work habits, no statistically significant differences existed between disability patterns with regard to success rate at completion of tutoring. In the area of social habits, however, significant difference was found. It is apparent from Table 29 that students having the HOD pattern were the most likley to mairtain a successful status in social habits. Pattern HEED was associated with the lowest success rate (64.2), indicating that students having that disability pattern were the least likely to be successful in social habits after tutoring.

TABLE 28. SUCCESS/NONSUCCESS STATUS OF INITIALLY UNSUCCESSFUL STUDENTS AT COMPLETION OF TUTORING FOR FOUR BEHAVIOR DISABILITY PATTERNS

		Pattern HEED		Pattern HOED		Pattern HED		Pattern HOD	
		Successful	Unsuccessful	Successful	Unsuccessful	Successful	Unsuccessful	Successful	Unsuccessful
Reading	f*	26	33	18	16	20	9	15	4
	%**	(44.1)	(55.9)	(53.0)	(47.0)	(69.0)	(31.0)	(79.0)	(21.0)
Mathematics	f	30	42	17	14	20	5	8	10
	%	(41.7)	(58.3)	(54.9)	(45.1)	(80.0)	(20.0)	(44.5)	(55.5)
Language	f	25	32	13	13	15	7	6	6
	%	(43.9)	(56.1)	(50.0)	(50.0)	(68.2)	(31.8)	(50.0)	(50.0)
Work Habits	f	29	46	13	13	22	6	9	4
	%	(38.7)	(61.3)	(50.0)	(50.0)	(78.6)	(21.4)	(69.3)	(30.7)
Social Habits	f	33	20	11	5	13	2	3	1
	%	(62.3)	(37.7)	(68.8)	(31.2)	(86.7)	(13.3)	(75.0)	(25.0)

* Frequency, or number of cases for each pattern.

** Percent of cases for each pattern.

TABLE 29. SUCCESS/NONSUCCESS STATUS OF INITIALLY SUCCESSFUL STUDENTS AT COMPLETION OF TUTORING FOR FOUR BEHAVIOR DISABILITY PATTERNS

		Pattern HEED		Pattern HOED		Pattern HED		Pattern HOD	
		Successful	Unsuccessful	Successful	Unsuccessful	Successful	Unsuccessful	Successful	Unsuccessful
Reading	f*	31	5	16	3	14	3	8	2
	%**	(86.1)	(13.9)	(84.2)	(15.8)	(82.3)	(17.7)	(80.0)	(20.0)
Mathematics	f	18	5	13	9	17	4	10	1
	%	(68.2)	(21.8)	(59.0)	(41.0)	(80.9)	(19.1)	(90.9)	(9.1)
Language	f	25	13	22	5	21	3	13	4
	%	(65.7)	(34.3)	(81.4)	(18.6)	(87.5)	(12.5)	(76.4)	(23.6)
Work Habits	f	15	5	23	4	14	4	14	2
	%	(75.0)	(25.0)	(85.1)	(14.9)	(77.7)	(22.3)	(87.5)	(12.5)
Social Habits	f	27	15	32	5	30	1	25	0
	%	(64.2)	(35.8)	(86.4)	(13.6)	(96.7)	(3.3)	(100.0)	(0.0)

* Frequency, or number of cases for each pattern.

** Percent of cases for each pattern.

A review of the data related to behavioral disability patterns revealed that Pattern HEED was most consistently associated with the lowest success rate. Students having Pattern HEED would exhibit symptoms of restlessness and continued activity, and would probably be the source of classroom disruptions. In addition, they would have difficulty in attending to specific tasks and lessons. Thus, it is not surprising that students having the disabilities in Pattern HEED were consistently the least successful, particularly in the areas of work and social habits.

In most cases, the highest success rate was associated with Pattern HOD. Compared with students having the HEED Pattern, students with Pattern HOD would generally be quiet in the classroom and less likely to produce disturbances. To some extent, these behaviors are desired by teachers, and interpreted as "successful" for the area of social habits.

Relation of Parent Awareness to Success

As previously indicated, a third factor, parent awareness, was investigated to determine its relationship to success/nonsuccess of tutored students. For each of the 263 students who had received tutoring (Groups RT, UNS, and LANG) a judgment was made regarding the degree of parental awareness of the learning disability.* For the 263 students the parents of 96 were judged to be considerably aware of the disability,

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* Judgments of parent awareness were made by a Columbus Department of Special Education researcher, based on information from tutors, classroom teachers, and permanent records.

94 were partially aware, and 73 were minimally aware.

The performance of initially unsuccessful students at the completion of tutoring is presented in Table 30. The number of students remaining unsuccessful and the number improving to a successful status is given for each category of parent awareness. When the percent of cases that achieved success was compared across the three categories of awareness, a distinct relationship is observed; as parental awareness decreased, the percent of students improving to a successful status likewise decreased. In reading, for example, the percent of successful students in the considerable awareness category was 80.8; in the partial awareness category, 50 percent achieved success; and, in the minimal awareness category, only 42 percent attained success. The chi square test was used to determine if the proportions of successful and unsuccessful students were statistically different between the three parent awareness groups. Results of this test indicated that for four subject/skill areas -- reading, mathematics, language, and work habits -- the percentages between the groups were significantly different. Specifically, the percentages of successful students in one category of parent awareness were consistently and reliably different (greater or less) from comparable percentages in another category. This indicates that as parental awareness of a disability increased, the likelihood for student success in reading, mathematics, language, and social habits increased also. In the fifth area, social habits, the differences between categories of awareness did not reach the level of significance required in this study (.01). A trend was noted in social skills, however, suggesting that those students whose parents were considerably aware of a disability were more likely to

TABLE 30. SUCCESS/NONSUCCESS OF INITIALLY UNSUCCESSFUL STUDENTS AT COMPLETION OF TUTORING BY CATEGORY OF PARENT AWARENESS

		Considerable Awareness		Partial Awareness		Minimal Awareness	
		Unsuccessful	Successful	Unsuccessful	Successful	Unsuccessful	Successful
Reading	f	10	42	29	29	29	21
	%*	(19.2)	(80.8)	(50.0)	(50.0)	(58.0)	(42.0)
Mathematics	f	14	39	30	31	34	19
	%	(26.4)	(73.6)	(49.1)	(50.9)	(64.1)	(35.1)
Language	f	10	27	24	19	28	21
	%	(27.0)	(73.0)	(55.8)	(44.2)	(57.7)	(42.3)
Work Habits	f	12	38	27	32	31	20
	%	(24.0)	(76.0)	(45.7)	(54.3)	(60.7)	(39.3)
Social Habits	f	4	18	8	26	16	20
	%	(18.1)	(81.9)	(23.5)	(76.5)	(44.4)	(55.6)

* Percent of initially unsuccessful in each category of parent awareness.

improve to a successful status than were students whose parents were minimally aware.

The performance of initially successful students at the completion of tutoring is presented for each category of parent awareness in Table 31. The apparent relationship illustrated in this table is consistent with that seen in Table 30. Inspection of the data indicates that as parent awareness decreased from considerable to minimal, the proportion of students maintaining a successful status decreased accordingly. To determine if the proportions of succussful students were different, the chi square test was used. The results indicated that for three areas -- mathematics, language, and social habits -- the proportions were significantly different. In other words, the likelihood that an initially successful student maintained that status after tutoring increased as degree of parent awareness increased. In the area of reading, a trend was noted, which suggested a similar relationship of increased success with increased parent awareness. In the area of work habits, no statistical differences existed between the proportions of successful students associated with each category of awareness.

In summary, it is apparent that a definite relationship does exist between degree of parent awareness and the success/nonsuccess status of the student after tutoring. Briefly, for initially unsuccessful students, the likelihood of success after tutoring increased as parental awareness increased. Similarly, the likelihood that an initially successful student would remain successful increased as parent awareness increased.

TABLE 31. SUCCESS/NONSUCCESS OF INITITALLY SUCCESSFUL STUDENTS AT COMPLETION OF TUTORING BY CATEGORY OF PARENT AWARENESS

		Considerable Awareness		Partial Awareness		Minimal Awareness	
		Successful	Unsuccessful	Successful	Unsuccessful	Successful	Unsuccessful
Reading	f	42	2	30	6	17	6
	%*	(95.4)	(4.6)	(83.3)	(16.7)	(74.0)	(26.0)
Mathematics	f	42	1	25	8	9	11
	%	(97.6)	(2.4)	(75.7)	(24.3)	(55.0)	(45.0)
Language	f	53	6	40	11	15	9
	%	(89.8)	(10.2)	(78.4)	(21.6)	(62.4)	(37.6)
Work Habits	f	41	5	28	7	17	5
	%	(89.1)	(10.9)	(80.0)	(20.0)	(77.0)	(23.0)
Social Habits	f	68	6	53	7	27	10
	%	(91.8)	(8.2)	(88.3)	(11.7)	(72.9)	(27.1)

* Percent of total successful for each category of parent awareness.

VI. DISCUSSION AND CONCLUSIONS

As indicated at the beginning of this report, the present study was concerned with three major research questions:

- Is the performance (academic and behavior) of neurologically handicapped (NH) students who have been tutored significantly different from those of similarly handicapped students who received no tutoring?
- Is a language-centered tutoring approach equally effective, more effective, or less effective, than the present unstructured approach?
- How are the factors of IQ, type of disability, and parent awareness related to success of tutored students?

Study findings and conclusions in connection with each of these questions are discussed below.

Tutoring vs. No Tutoring

With regard to the first research question, two measures of performance, average grades and success rate in five subject/skill areas, were utilized. The results of the study indicated that the average grades of tutored students improved significantly* in the five subject/skill areas at the completion of tutoring. After two years without tutoring, average

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* As used in this discussion, the term significant means that two or more values or proportions were statistically different, and that the size of the difference between the values was so large that it could have occurred by chance less than once in 100 times.

grades had decreased slightly but were still significantly higher than those recorded at identification. On the other hand, the average grades of NH students who received no tutoring remained the same or decreased between the year of identification and the 1970-71 school year. In work habits and social habits the decreases were significant. It appears reasonable to assume that continued failure in the academic subjects was an important factor in the deterioration of work and social related behavior. Comparison of the average grades of the untutored and the tutored groups indicated that the performance of the groups was reliably different, and that the consistently higher grades of the latter group could be attributed to the tutoring services received.

Differences in the success rate of tutored and untutored students provided further support for the hypothesis that tutoring significantly improved student performance. The percent of students who were unsuccessful at identification was comparable in all subject/skill areas for both groups. However, the percent of tutored students who were successful two years after tutoring was significantly different from (greater) the percent of untutored students two to six years after identification. Similarly, the percent of students maintaining a successful status was greater in all subject/skill areas for tutored students. These findings indicated that the likelihood of success was greater when tutoring was provided. It should be noted that the definition of success used in this study required student performance equivalent to an A, B, or C letter grade. Improvement from an F to a D, or from one successful grade to a higher one was not considered in the analysis. Had success been defined

as improvement to any grade higher than that recorded at identification, the success rate may have been even higher among the tutored students. The basis for using a C letter grade as the minimum level of success reflects the notion that this grade is typically attained by most non-handicapped students of average IQ. To function in a regular classroom with non-handicapped students, therefore, the NH student should be performing at a comparable level.

Based on the preceding findings, the following conclusions are offered with regard to the effectiveness of the tutoring program presently used:

- Tutoring, per se, appears to produce statistically reliable and consistent improvement in student performance that otherwise would probably not have occurred.
- While student performance decreased after tutoring had been terminated, the effects of tutoring appear to last over a period of at least two years (the period of time investigated).

Unstructured Tutoring vs. Language-Centered Tutoring

The second research question in this study investigated the extent to which student performance differed as a function of two different tutoring approaches. A language-centered approach and an unstructured

approach were compared using three measures of student performance: diagnostic test scores, average grades, and success rates. In general, no statistically significant differences in performance were found to exist between the groups for any of the three measures. Of the four diagnostic tests used (reading vocabulary, reading comprehension, mathematics facts, and mathematics concepts), the language-centered group showed significant gains in mathematics facts and mathematics concepts, while the group receiving unstructured tutoring improved significantly only in mathematics facts. When the gains for the two groups were compared, however, no significant differences between them were found. Regarding the second measure of performance, average grades in all five subject/skill areas improved significantly for the language-centered group, while those in four of the five areas showed similar significant gains for the group tutored by an unstructured approach. When the gains for the two approaches were compared, no statistically significant differences were indicated. Regarding the third performance measure, the proportion of initially unsuccessful students who attained success after tutoring, and the proportion of initially successful students who maintained that status after tutoring were calculated for each group. Statistical tests indicated that no significant difference existed between the type of tutoring approach used with regard to success rate of students after one year of tutoring.

Based on the findings comparing the two tutoring approaches, the following conclusion is offered:

- Performance of NH students tutored with a language-centered approach does not appear to differ significantly from that of students tutored by the unstructured approach which has been used since the establishment of the tutoring program in Columbus.

It should be noted that the training of tutors in the language-centered approach was accomplished during the school year while they were actually tutoring students. Although it was not possible, a preferable situation would have existed if all tutors using the language-centered approach would have received a short course in specific methodology prior to the beginning of the school year.

It should be pointed out that the effectiveness of each tutoring approach is described in this study only in terms of student performance. While the approaches do not appear to be different in this regard, results of an informal unpublished study by the Columbus Department of Special Education personnel suggested that the language-centered approach produced a noticeable impact on the tutors' attitudes and on their relationships with other teachers. The consequences of such changes should not be ignored in the overall evaluation of the two tutoring approaches. Therefore, further evaluation of the language-centered approach is probably warranted.

Characteristics of Successful Students

The final research question centered on determining the characteristics of students who were most likely to benefit from tutoring. Three characteristics were examined: IQ, type of disability, and parent awareness of a disability. All students who had received tutoring were

used as the population. In analyzing IQ, success rates at completion of tutoring were calculated for average (90 + IQ) and below average (80-89 IQ) IQ categories. Results of statistical tests showed that in reading, language, work habits, and social habits, the success rates associated with the two IQ categories were not significantly different. This indicates that at completion of tutoring, students having a below average IQ were as likely to have achieved a successful status in those four subject/skill areas as students having an average IQ. In mathematics, however, the success rates of initially unsuccessful students at completion of tutoring were significantly different for the two IQ categories. The data show that students of average IQ, were more likely to achieve success in that area than were students of below average IQ. The failure to find a significant difference in success rates between IQ categories is consistent with findings of a previously mentioned Battelle study relating IQ to academic success. The lack of relationship between IQ and success/nonsuccess may, in part, be due to the categories of IQ selected in this study. That is, the two categories (80-89, and 90+) do not represent extremes of a continuum. Had the lower IQ students been compared with those of much higher IQ (i.e., 120+), it is possible that a consistent relationship might have been observed. With the two categories selected for investigation in the present study, however, it is apparent that a significant statistical relationship, in general, did not exist.

It should be stressed that data were analyzed in terms of "success" and "nonsuccess" as defined in this study. The relative improvement of students in the two IQ categories was not analyzed. Therefore, it is possible that students in one category achieved a greater degree of improvement than did students in the other category.

The second characteristic of students investigated by this study was type of disability. Two types of disabilities (academic and behavioral) were analyzed. Results of the analysis on academic disability indicated that disabilities occurred in patterns or clusters rather than as individual disabilities. Five patterns of academic disabilities having relatively high frequencies were investigated. The results of statistical tests in each subject/skill area indicated that in most cases no statistically significant differences in success rates existed between the patterns.

When the disabilities associated with the lowest and highest student success rates were noted, it was apparent that the pattern combining small motor, visual, auditory, oral language, and written language disabilities (SVAOW), more consistently than any other pattern, was associated with the lowest success rate. This observation was not surprising when the interaction among the five different disabilities was considered. The disability pattern most often associated with the highest success rate was the combination of small motor, visual, and written language disabilities (SVW). While the nature of the data did not allow statistical analysis to determine the contribution of each disability in lowering success rate, it appears that an auditory disability (or auditory-related disability--oral language) or the combination of an auditory with a visual disability may result in more complex learning problems. The consistency with which Pattern SVAOW is associated with the lowest success rate may be a factor to consider in assignment of students to the tutoring program.

In the area of behavioral disabilities, it was again observed that patterns of disability rather than individual disabilities occurred. Four patterns of behavioral disabilities were selected for analysis. The results of statistical tests in each subject/skill area showed that generally the success rates associated with the disability patterns were not significantly different, indicating that a student having a particular pattern was as likely to be successful after tutoring as a student having any other pattern.

A review of the data and findings related to behavioral disability patterns revealed that a combination of hyperactivity, emotional overlay, and distractibility (HEED), more consistently than any other pattern, was associated with the lowest success rate. On the other hand, Pattern HOD was associated, in most cases, with the highest success rate. An examination of the characteristics of each pattern provides a reasonable explanation of this observation, particularly with regard to the significant findings in the areas of work habits and social habits. The student who exhibits Pattern HEED is continually active, easily distracted, and will obviously have difficulty in concentrating on lessons. While a student's behavior problems may not be considered in grading academic subjects, they are graded directly under the areas of work habits and social habits. Thus, it is not surprising to find significantly lower success rates for students having the HEED pattern.

The student characterized by the HOD pattern is easily distracted, but usually is quiet and less likely to be a source of classroom

disturbances. It is reasonable to assume that such traits are, to some extent, desired by teachers, and interpreted as "successful" behavior in the area of social habits.

Of the three factors investigated in the final phase of this study, the third one, degree of parent awareness of a disability, showed the most consistent relationship to success/nonsuccess. This finding is consistent with a previously mentioned Battelle study which reported the attitudes of parents of successful students to be significantly more cooperative than parents of unsuccessful students. In general, a distinct pattern was noted regarding the success/nonsuccess of students at the completion of tutoring. In all cases, as the degree of parent awareness increased, the proportion of students achieving or maintaining success increased accordingly. The results of statistical tests showed that differences in the proportions were significant. That is, a student whose parents were considerably aware of his disability was more likely to be successful at the completion of tutoring than was a student whose parents were minimally aware.

Based on the preceding findings related to characteristics of successful students, the following conclusions are offered.

- Tutored students of lower IQ (80-89) appeared to be as successful (as defined in this study) as students with average or above average (90+) IQ.
- Students exhibiting a particular pattern of academic disabilities appeared to be as successful as students exhibiting any other pattern.

- Students having a particular pattern of behavioral disabilities appears to be as successful as students having any other pattern.
- It appeared that students whose parents were considerably aware of a disability were more likely to be successful than students whose parents were minimally aware of a disability.

The findings of this study were reported in terms of statistical significance and nonsignificance. Findings which are of statistical significance may or may not have been important in a practical sense. For example, the difference between two success rates may be statistically significant, but both rates may be below a level which is considered acceptable. Thus, the findings should be carefully considered by educators to determine their practical educational significance.

SECTION VII: SUGGESTIONS FOR FURTHER RESEARCH

As the present study reports, the behaviors exhibited by students having a neurological handicap are quite varied. While some students may exhibit one type of disabling behavior, other may show symptons of two or more different types of disabilities. Also, disabilities may be manifested in difficulties directly related to academic achievement, and/or may result in behavior problems in and outside the classroom. Future research on students with a neurological handicap, therefore, should consider the uniqueness of the disabilities associated with each student. With this consideration in mind, the following areas of research are suggested.

Development of a Short-Course Training Program for Tutors

It is recognized that preservice training of teachers has, in many cases, failed to provide the certificated teacher with basic and practical information related to teaching handicapped children. Often the tutors of neurologically handicapped students have no special training related to that handicap and, to some extent, must depend on trial-and-error teaching. Thus, it appears that a short course should be developed as one means of familiarizing such tutors with basic information.

The central element of such a short course would be a handbook or manual developed as a guide for various tutor activities. Use of the handbook would be supplemented with group meetings of tutors, conducted by experienced instructors. In these meetings, procedures, methodologies, and materials would be presented and discussed.

It appears that a handbook for use in a short course should cover, at least, the following areas:

- Assessment of students abilities and disabilities.
- Interpretation of student disabilities, or disability patterns, in terms of present and potential performance (academic and behavioral).
- Prescription of specific methodologies and materials to deal with each student's unique disability or disability pattern.
- Periodic evaluation of academic and behavioral performance.
- Adjustment of objectives, methodology, and materials, if necessary, based on the evaluation.

While suggestions and alternatives in the treatment of NH students should be provided, the short course should stress the uniqueness of each student and the need for tutors to be flexible in their prescription and instructional methodolgy.

Development of Behavioral Objectives for Students With Academic and Behavioral Disabilities

A problem commonly faced by educators who would attempt to evaluate special education programs is related to the criteria used to define "success", "improvement", "progress", etc. For example, in many cases, tests standardized on "normal" student populations are utilized. Where grades are used, teachers, knowing that a child is handicapped, may report higher or lower grades than those actually earned by the student.

To provide a consistent and objective means of evaluating performance of NH students, before instruction is initiated, teachers should be cognizant of desired behaviors or levels or performance that are within the capacity of each student. Specifically, the behaviors a student is expected to demonstrate (after instruction) should be stated in terms of behavioral objectives. Evaluation of student performance (and to some extent, teaching methodologies) is based on the extent to which the student is able to meet the behavioral objectives.

The heterogeneous characteristics of NH students mentioned previously precludes the establishment of behavioral objectives that could be applied without modification to all students diagnosed as having this handicap. Thus, it would be necessary to distinguish the various types of disabilities, or disability patterns, so that objectives specific to each could be prepared. Objectives would then be written for each type of disability for each of several subject/skill areas (at both the elementary and secondary levels) in which a student is commonly graded.

Development of Techniques to Screen Students for Neurological Handicap

Educators generally agree that the age at which a handicap is identified bears a direct relationship to students success in school. In general, the earlier the student is identified and provided with special assistance, the greater is his chance of successfully competing with his peers. While physical handicaps such as blindness and deafness are relatively easy to identify, a neurological impairment (learning disability) is not. In many cases, an NH student is considered to be stubborn or uncooperative by teachers and parents, and the disability may never be identified.

Because it is not feasible in any school system to administer detailed individual evaluation tests to every student to detect the presence of a learning disability, procedures for screening students should be developed. Based on the results of such screening, students suspected of having NH disabilities would be referred for a more complete evaluation by psychologists, physicians, and others. Screening procedures should be simple enough for quick administration by a classroom teacher or other person who regularly has contact with students, yet the procedures should yield enough information so that exaggerated behaviors of nonhandicapped students could be discriminated from real problems identifying handicapped students. Because of the variety of behaviors which are labelled "NH" or "learning disability", screening procedures must be somewhat comprehensive in scope. Further, to the extent symptoms of a particular disability vary with age level, procedures must also be specific to established levels.

The development and use of screening procedures for NH or learning-disabled students would provide an opportunity to offer assistance to students who otherwise would be destined to continue academic failure and related behavioral problems.

APPENDIX A

STUDENT RECORD FORM

STUDENT RECORD FORM

STUDENT CODE: . . . . . GROUP . . (Identified, No Help)

BIRTH: YEAR . . . MONTH . . . DAY . . . REFERRAL: YEAR . . .

GRADE LEVEL AT IDENTIFICATION . . NO. OF YEARS SINCE IDENTIFICATION . .

NO. OF GRADE LEVELS REPEATED . . GRADE LEVELS REPEATED: K 1 2 3 4 5 6

I.Q. LEVEL AT REFERRAL . . . . MOST RECENT I.Q. LEVEL . . . .

STUDENT GRADES

	READING	MATH	LANG.	WORK HABITS	SOCIAL HABITS	GR. CODE
AT IDENTIFICATION	. .	. .	. .	. .	. .	A- - -5
CURRENT	. .	. .	. .	. .	. .	B-R-M-4
						C-S-P-3
						D-I-N-2
						F- - -1

SEVERITY OF DISABILITY (Enter 1 for Yes, 0 for No for Each Category)

SMALL-MOTOR . . VISUAL . . AUDITORY . . ORAL-LANG. . . WRITTEN-LANG. . . TOTAL . . .

HYPERACTIVE . . HYPOACTIVE . . EMOTIONAL-OVERLAY . . DISTRACTABLE . . TOTAL . . .

PARENT AWARENESS (Enter 1 for Yes, 0 for No for Each Category)

AWARENESS: CONSIDERABLE . . PARTIAL . . MINIMAL . .

REMARKS: _____

_____

STUDENT RECORD FORM

STUDENT CODE . . . . . GROUP: . . (Tutored 2 Years Ago)

BIRTH: YEAR . . . MONTH . . . DAY . . . REFERRAL: YEAR . . .

GRADE LEVEL AT BEGINNING OF TUTORING . . NO. OF YEARS OF TUTORING . .

NO. OF GRADE LEVELS REPEATED . . GRADE LEVELS REPEATED: K 1 2 3 4 5 6

I.Q. LEVEL AT REFERRAL . . . . MOST RECENT I.Q. LEVEL . . . .

STUDENT GRADES

	READING	MATH	LANG.	WORK HABITS	SOCIAL HABITS	GR. CODE
AT IDENTIFICATION	. .	. .	. .	. .	. .	A- - -5 B-R-M-4
AT COMPLETION OF TUTORING . .	. .	. .	. .	. .	. .	C-S-P-3 D-I-N-2
2 YEARS AFTER TUTORING	. .	. .	. .	. .	. .	F- - -1

SEVERITY OF DISABILITY (Enter 1 for Yes, 0 for No for Each Category)

SMALL-MOTOR . . VISUAL . . AUDITORY . . ORAL-LANG. . . WRITTEN-LANG. . . TOTAL . . .

HYPERACTIVE . . HYPOACTIVE . . EMOTIONAL-OVERLAY . . DISTRACTABLE . . TOTAL . . .

PARENT AWARENESS (Enter 1 for Yes, 0 for No for Each Category

AWARENESS: CONSIDERABLE . . PARTIAL . . MINIMAL . .

REMARKS: _____

_____

STUDENT CODE: . . . . . GROUP: . . (Regular Tutoring Currently)

BIRTH: YEAR . . . . MONTH . . . . DAY . . . REFERRAL: YEAR . . .

GRADE LEVEL AT BEGINNING OF TUTORING . . NO. OF YEARS OF TUTORING . . .

NO. OF GRADE LEVELS REPEATED . . GRADE LEVELS REPEATED: K 1 2 3 4 5 6

I. Q. LEVEL AT REFERRAL . . . . MOST RECENT I.Q. LEVEL . . . .

STUDENT GRADES AND STANDARDIZED-TEST PERFORMANCE

	READING	MATH	LANG.	WORK HABITS	SOCIAL HABITS	GR. CODE
JUNE, 1970						A- - -5 B-R-M-4 C-S-P-3 D-I-N-2 F- - -1
GRADES	. .	. .	. .	. .	. .	
MAY, 1971						
GRADES	. .	. .	. .	. .	. .	

SEVERITY OF DISABILITY (Enter No. of Items Checked for Each Category)

SMALL-MOTOR . . VISUAL . . AUDITORY . . ORAL-LANG. . . WRITTEN-LANG. . . TOTAL . . .

HYPERACTIVE . . HYPOACTIVE . . EMOTIONAL-OVERLAY . . DISTRACTABLE . . TOTAL . . .

PARENT AWARENESS (Enter No. of Items Checked for Each Category)

AWARENESS: CONSIDERABLE . . PARTIAL . . MINIMAL . . TOTAL . . .

DIAGNOSTIC TEST SCORES (Percentiles)

	READING		MATH	
	VOCAB.	COMPREH.	FACTS	CONCEPTS
SEPTEMBER	. . .	. . .	. . .	. . .
JUNE	. . .	. . .	. . .	. . .

TEST NAME _____ _____

REMARKS: _____

STUDENT CODE: . . . . . GROUP: . . (Innovative Tutoring Currently)

BIRTH: YEAR . . . MONTH . . . DAY . . . REFERRAL: YEAR . . .

GRADE LEVEL AT BEGINNING OF TUTORING . . NO. OF YEARS OF TUTORING . .

NO. OF GRADE LEVELS REPEATED . . GRADE LEVELS REPEATED: K 1 2 3 4 5 6

I. Q. LEVEL AT REFERRAL . . . . MOST RECENT I.Q. LEVEL . . . .

STUDENT GRADES AND STANDARDIZED-TEST PERFORMANCE

	READING	MATH	LANG.	WORK HABITS	SOCIAL HABITS	GR. CODE
JUNE, 1970						A- - -5 B-R-M-4 C-S-P-3 D-I-N-2 F- - -1
GRADES	. .	. .	. .	. .	. .	
MAY, 1971						
GRADES	. .	. .	. .	. .	. .	

SEVERITY OF DISABILITY (Enter No. of Items Checked for Each Category)

SMALL-MOTOR . . VISUAL . . AUDITORY . . ORAL-LANG. . . WRITTEN-LANG. . . . TOTAL . . .

HYPERACTIVE . . HYPOACTIVE . . EMOTIONAL-OVERLAY . . . DISTRACTABLE . . TOTAL . . .

PARENT AWARENESS (Enter No. of Items Checked for Each Category)

AWARENESS: CONSIDERABLE . . PARTIAL . . MINIMAL . . TOTAL . . .

DIAGNOSTIC TEST SCORES (Percentiles)

	READING		MATH	
	VOCAB.	COMPREH.	FACTS	CONCEPTS
SEPTEMBER	. . .	. . .	. . .	. . .
JUNE	. . .	. . .	. . .	. . .

TEST NAME _____ _____

REMARKS: _____

APPENDIX B

PROGRESS REPORT

Recommendation for Service

Columbus Public Schools
Department of Special Education
52 S. Starling St.
Neurologically Handicapped Program

___Tutor
___New ___Renewal
___Class
Parent is aware of class and ___would
___would not accep

Date_____ Progress Report

Child's Name_____ Birthdate_____

Address_____ Parents_____ Telephone_____

School_____ Grade_____ Grade next term _____

Psychological Date_____ C.A._____ M.A._____ I.Q._____

This child is being graded according to grade level expectancies _____
This child is being graded with consideration to his/her handicap _____

Current Grades

___ Language
___ Spelling
___ Writing
___ Reading
___ Mathematics
___ Social Studies
___ Science
___ Music
___ Art
___ Physical Education

DISABILITY RATING AS RELATED TO LEARNING TASKS (Check disabilities)

Small Motor Functioning

___Has difficulty with cutting with scissors, using crayons or pencil
___Tires quickly with paper/pencil tasks
___Has poor handwriting

Visual Functioning

___Cannot judge visually similarities and differences in shapes, letters or wor
___Frequently "sees" things reversed or upside-down; i.e. b-d, w-m, h-g, etc.
___Has difficulty with "whole word approach" in reading; i.e. confuses similar appearing words, dog-boy, house-horse, etc.
___Shows a combination of visual and motor difficulties as exhibited by an inability to copy correctly or finish written assignments
___Exhibits difficulty remembering the appearance or the reproduction of lette

Auditory Functioning

___Has difficulty following oral directions
___Appears not to be "tuned-in" to classroom activities
___Makes irrelevant answers to questions
___Cannot distinguish auditory similarities and differences; i.e. than-then, set-sit, rack-rag, thread-bread
___Has difficulty with learning "phonic" tasks
___Cannot remember the sequence of events or the facts about a story presented orally

Language Functioning

Oral Language Difficulties

___Has a speech problem
___Exhibits delayed verbal responses
___Produces oral sentences that do not make sense; i.e. confusion of word orde omissions of endings, prepositions, or articles
___Produces oral responses that are often limited to one word or phrase answer i.e. fragmented sentences
___Produces oral responses that show confusion of word meaning because of similar sounding words; i.e. "department" for "apartment", "subscription" for "prescription"
___Produces oral responses that show lack of awareness of concepts; i.e. "cats lay kittens", "a tunnel is dirty"

Written Language Difficulties

___Shows inability to write "own" sentence or story, omitting words and not producing complete sentences

___Makes frequent spelling and punctuation mistakes

___Limited rigid experience; i.e. long list of identical or nearly identical sentences with only minor changes

Mathematics

___Uses concrete objects with understanding

___Can use words to express concept

___Can apply numerals and signs to concept

___Can relate these to story problems

___Retains and recalls facts

___Makes practical application of these

Behavioral Difficulties

Hyperactive

___Often out of seat; moves often

___Plays with objects or "fidgits" when required to sit still

Distractable

___Short attention span

___Does not follow directions

___Does not complete work unless supervised

___Distracted by extraneous sights or sounds

Hypoactive

___Withdrawn in his "own world"

___Avoids personal-social relationships with peers

___Acts "shy" and not "tuned-in"

Emotional Overlay

___Overeacts to common situations

___"Falls apart" in minor crises

___Considered "bad" or "different" by teachers, family, or peers

___Does not change behavior or "learn" from punitive discipline

___Temper tantrums

IS THIS CHILD FUNCTIONING AT AN ADEQUATE LEVEL IN THE CLASSROOM?

___Yes

___No - This child is being graded according to grade level expectancies

___No - This child is being graded with consideration of his/her handicap

___No - Maladaptive behavior is interferring with progress and achievement

PARENTS ATTITUDE TO LEARNING DISABILITY - (Gage to Judge Awareness)

Considerable Awareness (Cooperative with school and child's handicap)

___States child is handicapped

___Recognizes limitations of treatment

___Parent requests information about suitable training

Partial Awareness (Cooperative with school but not able to cope with child's handicap - overprotective, punitive)

___Parent describes symptoms but still has questions about cause

___Parent hopes for improvement but fears improvement

___Parent questions his own ability to cope with problem

Minimal Awareness (Uncooperative with school)

___Parent refuses to recognize that certain characteristics of difficulty are abnormal

___Parent blames causes other than the real one

___Parent believes treatment will produce a normal child